MENKAR Level Indicator

Operating instructions

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MECON
FLOW-CONTROL-SYSTEMS

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1 Safety instructions

1.1 General Information

Read the instructions carefully before installing the device and put it into operation.

This manual is intended for correct installation as well as operation and maintenance of the devices.

Specially designed or customised models and specialised applications are not included in this manual.

1.2 Disclaimer

The manufacturer will not be liable for any damage using its product, including, but not limited to direct, indirect incidental, punitive and consequential damages.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to revise the content of this document, including this disclaimer, without prior notification and will not be liable in any way for possible consequences of such changes.

1.3 Product liability and warranty

The Operator of these level indicators is responsible for the suitability, proper use and corrosion resistance of the used materials with regard to the measuring material. It must be ensured that the materials selected for the parts of the level indicator coming into contact with the medium are suitable for the used process media. Mecon GmbH can assume no guarentee for repair work carried out by the customer without prior notification and consultation.

In this case of complaint, the rejected parts must be returned to us, if no other arrangement has been made.

1.4 Safety instructions for the operator

The effective pressure of the installation (the maximum permitted by the pressure limiting valve) must never be greater than the maximum permitted pressure Ps, marked on the instrument nameplate.

The user must be sure that materials in contact (guide tube, float, gaskets, etc.) with the fluid used are compatible with the fluid and conform to ageing characteristics of the fluid used and the measurement environment. These have either been recommended in the instructions or form the subject of a particular specification in the contract.

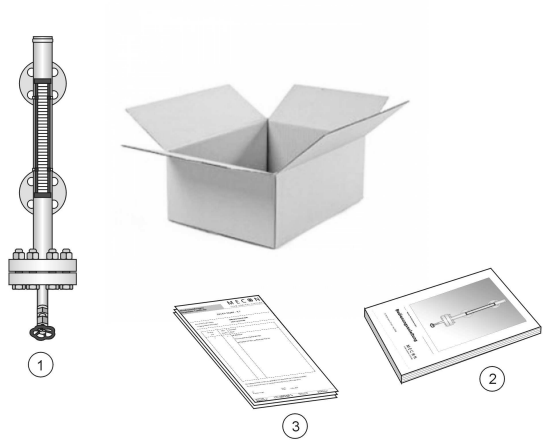
The external pressure (P_{ext}) must be equal to atmospheric pressure (P_{atmos})

No external loads may act upon the device. The level indicator is primarily designed for static applications.

Before replacing the standpipe/float, check that the unit is free from hazardous media and pressures.

2 Device description

2.1 Scope of delivery



1 Level indicator MENKAR K/KM/KA

2 Operating instructions

3 Certificates (optional)

Fig. 2.1 Scope of delivery

Information!
Please check the delivery for completeness using the packing list.

2.2 Device versions

2.2.1 MENKAR K – Level Indicator without on site display

Fig. 2.2 MENKAR K with contacts

The standard version of the *MENKAR* has no local display.

For control systems (acoustic or optical signals, motor and valve control systems or similar) magnetically actuated contact units are available.

The arrangemant of contacts is possible in any order and number (except for a minimum distance).

2.2.2. MENKAR KM – Level Indicator with magnet flapper type indicator

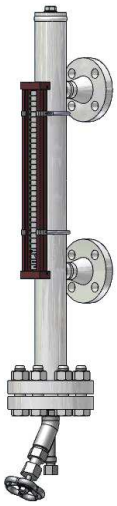


Fig. 2.3 MENKAR KM (Standard device)

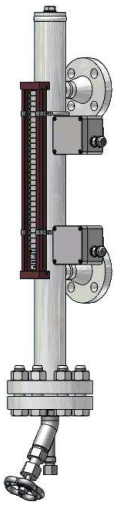


Fig. *2.4* MENKAR KM with contacts

The standard version of *MENKAR KM* has a local display by use of a magnetic flapper type indicator (Fig. 2.3). The vertical movement of the float causes a color change of the magnetic flapper corresponding to the level.

Optionally magnetically actuated contacts are available for the *MENKAR KM* (Fig. 2.4.) for control applications (acoustic or optical signals, motor and valve control systems, etc.). The arrangement of these contacts is, apart from a minimum distance, which is a result oft he desgin, possible in any order and number.

Fig. 2.5 MENKAR KM with magnet flapper and percentage display

Upon request the *MENKAR KM* is available with an additional percentage display for a better readability of the local display (magnetic flapper) (see Fig. 2.5).

2.2.3 MENKAR KA- Level indicator with on site display

Fig. 2.6 MENKAR KA

The standard version of the *MENKAR KA* has a local display by use of an external transparent tube display with a float (Fig.2.6).

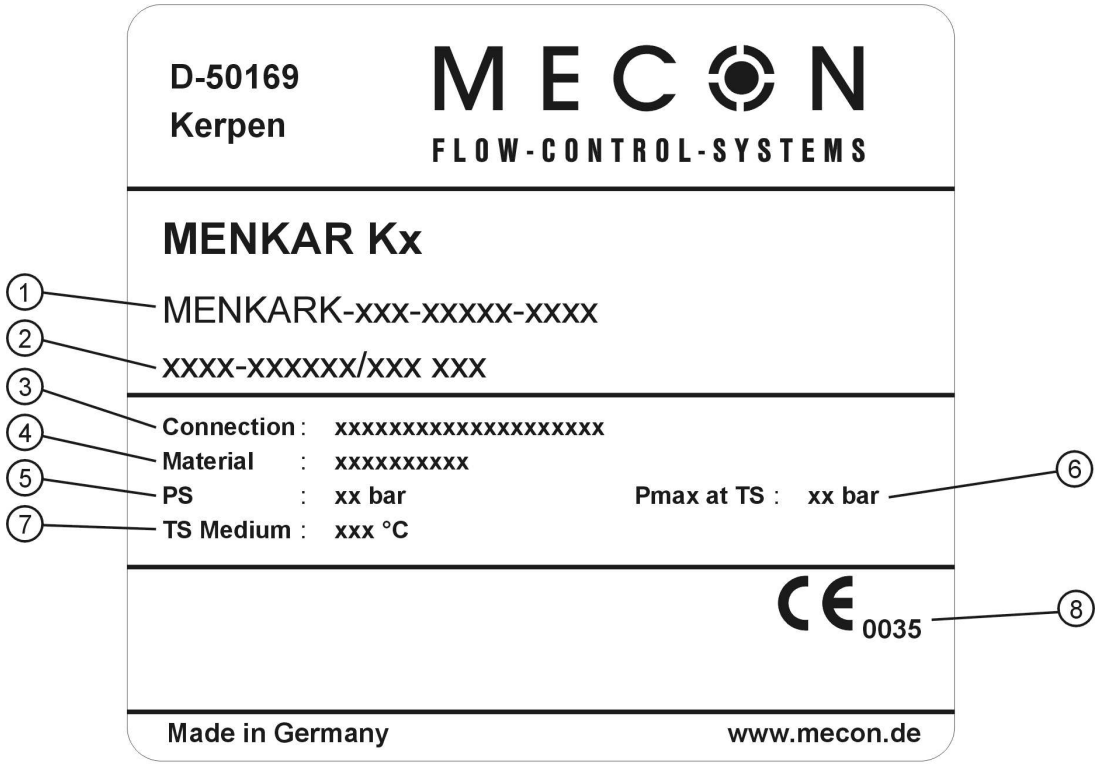
The vertical movement of the measuring float causes a position change of the display float corresponding the level.

2.3 Nameplate

Important!

Please refer to the device nameplate to ensure that the device is built according to your order.

Check particulary for the correct supply voltage.

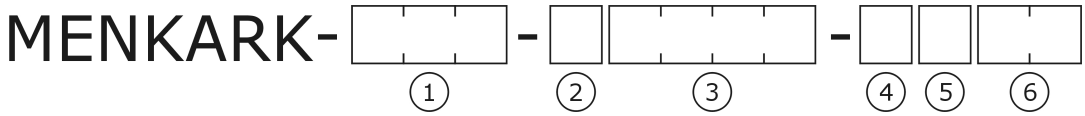


1	Code number	Device specific code number
2	Year / Serial number	Device specific serial number and the year it was built
3	Connection	Connection type of the device
4	Material	Material of the wetted parts
5	PS	Maximum pressure of the medium
6	Pmax at TS	Maiximum temperature of the medium at temperature TS
7	TS Medium	Maximum temperature of the medium
8	CE-Marking	Category acc. To Pressure Equipment directive (PED)

Fig. 2.7 Nameplate MENKAR

2.4 Description code

The decription code consists of the following elements:



① Process connections

	EN1092-1	ANSI B16.5
Nominal size		
Axx	DN 15	½"
Bxx	DN 20	¾"
Cxx	DN 25	1"
Dxx	DN 32	1 ¼"
Exx	DN 40	1 ½"
Fxx	DN 50	2"

Pressure rating			
x**D**x	PN 40	(EN 1092-1)	
x**E**x	PN 63	(EN 1092-1)	
x**F**x	PN 100	(EN 1092-1)	
x**G**x	PN 160	(EN 1092-1)	
x**P**x	PN 250	(EN 1092-1)	
x**H**x	150 lbs	(ASME B16.5)	
x**J**x	300 lbs	(ASME B16.5)	
x**K**x	600 lbs	(ASME B16.5)	
x**L**x	900 lbs	(ASME B16.5)	
x**M**x	1500 lbs	(ASME B16.5)	
x**N**x	2500 lbs	(ASME B16.5)	

Flange Form			
xx**A**	B1	(EN 1092-1)	PN 40
xx**B**	B2	(EN 1092-1)	PN 100 - PN 250
xx**C**	Form D	(EN 1092-1)	PN 40 - PN 250
xx**D**	Form C	(EN 1092-1)	PN 40 - PN 250
xx**G**	Form RF	(ASME B16.5)	150lbs - 2500lbs
xx**H**	Form FF	(ASME B16.5)	150lbs - 2500lbs
xx**J**	Form RTJ	(ASME B16.5)	150lbs - 2500lbs

WT1	Welding end DN 15 (Length 60 mm)
WT2	Welding end DN 20 (Length 60 mm)
WT3	Welding end DN 25 (Length 60 mm)
WN1	Welding end ½" (Length 60 mm)
WN2	Welding end ¾" (Length 60 mm)
WN3	Welding end 1" (Length 60 mm)

② Design

K	Menkar K	(without on site display)
M	Menkar KM	(with magnet flapper display)
P	Menkar KM	(with magnet flapper display and percentage display)
A	Menkar KA	(with on site display)

③ Center distance

□□□□	Center distance in mm

④ Drain connection

A	Drain plug G ½
C	Bleed valve G ½
X	without
Z	Special drain connection

⑤ Ventilation

A	without (cap)
B	Screw plug G 1/2
C	Ventilation valve G 1/2
Z	Special ventilation

⑥ Measuring float

1A	in Titanium for density 0,40 – 0,500 kg/dm³
1B	in Titanium for density 0,51 – 0,600 kg/dm³
1C	in Titanium for density 0,61 – 0,700 kgdm³
1D	in Titanium for density 0,71 – 0,795 kgdm³
04	in Titanium for density 0,76 - 0,835 kg/ dm³
10	in Titanium for density 0,81 – 0,900 kg/dm³
11	in Titanium for density 0,91 – 1,0 kg/dm³
1E	in Titanium for density 0,51 - 0,600 kg/ dm³ pressure relieved
1F	in Titanium for density 0,61 - 0,700 kg/ dm³ pressure relieved
1G	in Titanium for density 0,71 - 0,795 kg/ dm³ pressure relieved
05	in W.Nr. 1.4571 for density 0,85 - 0,950 kg/ dm³
06	in W.Nr. 1.4571 for density 0,96 - 1,150 kg/ dm³
07	in W.Nr. 1.4571 for density 1,16 - 1,295 kg/ dm³
08	in W.Nr. 1.4571 for density 1,20 - 1,500 kg/ dm³
6A	in W.Nr. 1.4571 for density 1,00 - 1,150 kg/ dm³ pressure relieved
7A	in W.Nr. 1.4571 for density 1,16 - 1,295 kg/ dm³ pressure relieved
8A	in W.Nr. 1.4571 for density 1,20 - 1,500 kg/ dm³ pressure relieved

Additional options

K01	1x contact KA 23
K02	2x contact KA 23
...	....
K09	9x contact KA 23
K11	1x contact KA 33
K12	2x contact KA 33
...	....
K19	9x contact KA 33
K21	1x contact KA 33i
K22	2x contact KA 33i
...	....
K29	9x contact KA 33i
M02	200mm electric remote transmitter 4-20mA (scanning 5mm)
M03	300mm electric remote transmitter 4-20mA (scanning 5mm)
...	....
M10	1000mm electric remote transmitter 4-20mA (scanning 5mm)

3 Installation

3.1 Installation conditions

- The level indicator *MENKAR* must be installed vertically on the tank.
- When installing the *MENKAR* level indicator with or without the electrical level transducer system, make sure that any magnetic fields generated by other equipment will not affect the measurement.
- Select bolts and gaskets (supplied by customer) that correspond to the pressure rating of the connecting flange and the operating pressure.

  The process connections (flanges) must fit perfectly, i.e. they must be centred, parallel and bolted in a professional way, in order to avoid unneccessary mechanical stress on the installation.
- The tank must be free of contaminants. It is recommended to install shut-off elements, e.g. taps, valves, etc. between the tank and the level indicator to allow the level indicator to be cleaned independently of the tank. To simpilfy the cleaning procedure the drain plug in the bottom flange could be replaced by a bleed valve with a discharge line.
- Remove the transport securing device from the fitting.
- Verify prior to installation that the float slides smoothly in the fitting without canting or deadlocking.

3.2 Mechanical installation conditions

- The effective pressure of the installation (permitted by the pressure limiting valve) must never be greater than the maximum pressure PS given on the nameplate of the device.
- The user has to ensure the compatibility of the materials in contact with the fluid (guide tube, float, gaskets, etc.) and as well the conformity to ageing characteristics as the suitability to the measurement environment. This information is either given in the operating instructions or it’s explicit specified in the contract.
- The external pressure (P_{ext}) must be equal to atmospheric pressure (P_{atmos}).

3.3 Storage

- Store the device in a dry and dust-free place.
- Keep away from direct sun and heat.
- Avoid external load to the device.
- The storage temperature range for standard devices with electrical components is about -40 … +70 °C / -40 … +158 °F.

4 Magnetic contact systems

4.1 Safety instructions

Warning!

All work on the electrical connections may only be carried out by a specialist. Ensure that the power is disconnected.

Observe all occupational safety regulations unconditionally. It is essential to regard the voltage data on the nameplate.

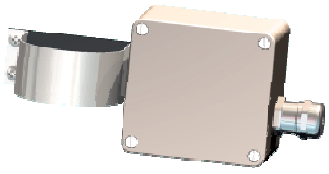
4.2 Types of contact systems

Either reed gas contacts or inductive slot initiators are available for the magnetic contact system.

The reed gas contacts can be used directly as a passive switch in existing electric circuits; the inductive contacts require an isolation amplifier.

4.2.1 Reed gas contacts

The magnetic contact system KA 23 and KA33 have integrated reed gas contacts.



The electrical function of these two contacts is identical – only the type of cable connection is different.

For technical data please refer to the following table.

Technical data	KA 23	KA 33
Housing material	Aluminium	
Protection class	IP 65	
Mounting	Clip on standpipe	
Cable connection	PG 11	Connector acc. EN 175301-803
Type of contact	Reed gas contact, potential free	
Switching function	change over contact, CO	
Contact material	Ag-Pd	
Contact rating (max.)	AC: 250V eff./1A/150VA; DC: 250V/1A/100W	

Tab. 4.1 Technical data for contact systems with reed gas contact

Electrical connection of the KA23

The lid of the KA23 can be removed by loosen the four mounting screws. Insert the cable via the cable gland and connect the wires to the screw terminals oft he KA23.

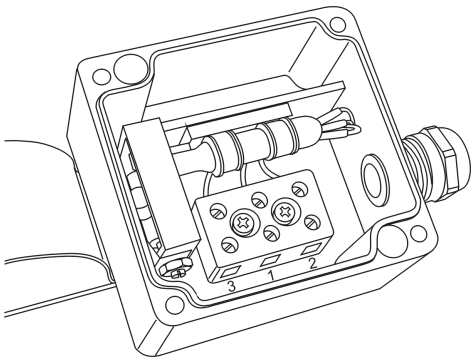


Fig. 4.1 Connection compartement of the contact system KA 23

For the connection assignment please refer to the following connection scheme.

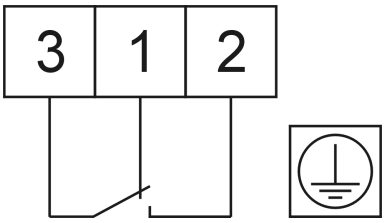


Fig. 4.2 *Connection scheme of the contact system KA 23*

Electrical connection of the KA33

The electrical connection of the KA33 is compared to the KA23 made by a rectangular connector according to EN 175301-803. Therefor it is not neccessary to open the housing of the contact system.

For the connection assignment please refer to the following connection scheme.

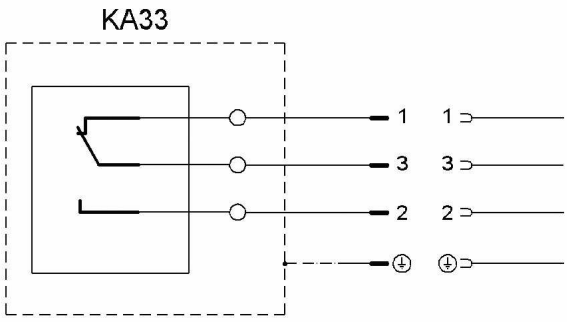


Fig. 4.3 Connection scheme of the contact system KA33

4.2.2. Inductive slot initiators

Contact devices KA33i are equipped with inductive slot initiators of the type SJ3.5-N.

For technical data please refer to the following table.

Technical Data	KA 33i
Housing material	Aluminium
Protection class	IP 65
Mounting	Clip on standpipe
Cable connection	Connector acc. EN 175301-803
Switch type	SJ3,5-N
Switching function	NAMUR, NC
Voltage U_O	8.2 V DC (R_i ca. 1 kΩ)
Supply voltage	5 … 25 V DC

Tab. 4.2 Technical Data for contact systems with slot initiators

Important!
The applied limit switches SJ3,5-N are NC contacts according to NAMUR recommendation NE21. The desired switching function of the limit switch has to be realized by the relay contact of the external isolation amplifier (changeover contact).

Electrical contact KA33i

The electrical connection of the KA33i is in contrast to the type KA23 with a rectangular connector according to EN 175301-803. It is not neccessary to open the housing of the contact system to produce an electrical connection.

The connection assignment, please refer to the following connection scheme

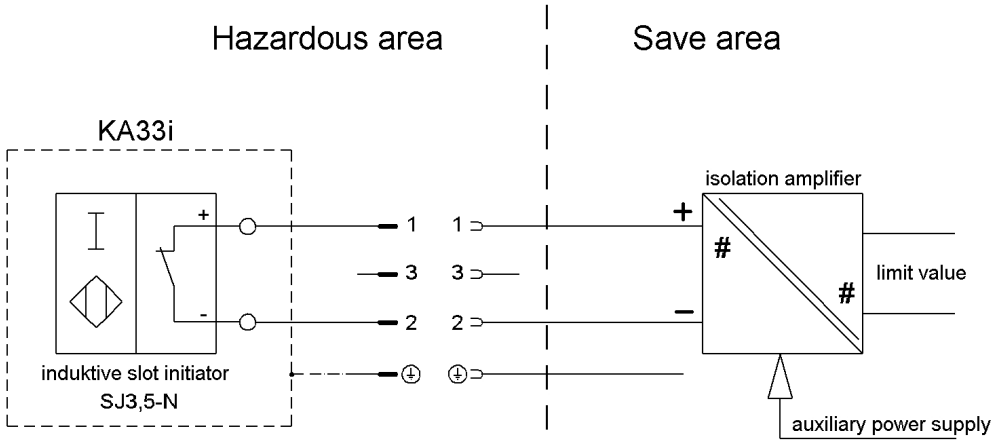


Fig. 4.4 Connection scheme of the contact system KA33i

4.3 Setting the switching point

The switching point can be set over the entire measuring range by varying teh position of the limit switch.

Important!
*Unless otherwise desired by the customer, the factory set value for the switching point is for devices with one limit switch about **40 % of URV** and for devices with two limit switches about **20% / 80% of URV**.*

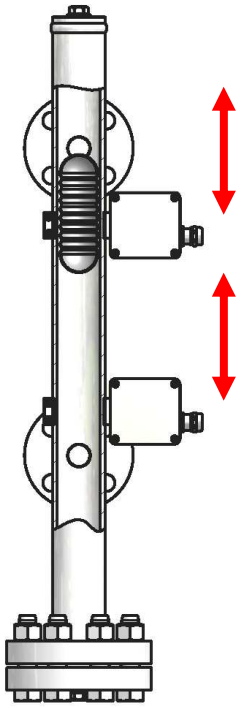


Fig. 4.5 Adjustment of the switching point

To set limit switches at the desired position the following steps have to be observed:

- Unloosen the two little fixing screws before moving the limit switch.
- Set the contact device in the desired position.
- Tighten the screws to fix the contact(s).

4.4 Protection class

The housing of the contact systems are made of aluminium and will meet all requirements of protection class IP 65.

Caution!

After installation and many maintenance works on the device, the operator has to check and ensure the specified protection class again.

Therefore pay regard to the following issues:

- Mounting screws of the contact systems must be tightened.
- All gaskets (lids and cable glands) have to be undamaged. Broken gaskets have to be replaced.
- The cable glands must be free of any damage and tightened. Broken cable glands have to be replaced.
- Install the cables with a loop in front of the cable glands so that moisture does not get inside the contact systems.

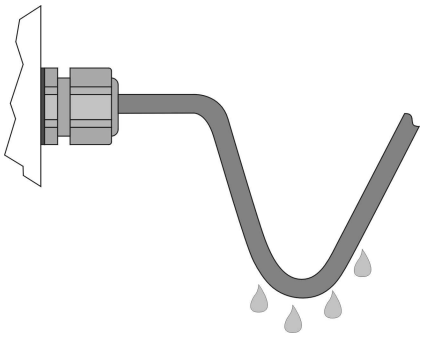


Fig. 4.6 Installing the cables in front of the cable glands (loop)

5 Operation

5.1 Operating principle

The MENKAR level indicators operate according to the system of communicating tubes and the float principle, as described below:

The medium leaves the vessel entering the standpipe through the lower connection line. As a result of this the measuring float located in the standpipe elevates corresponding to the actual level in the vessel.

This degree of elevation or each movement of the float (as a result of a change of the fluid level) is transmitted via a magnet installed in the measuring float. For the *MENKAR KM* on the magnetic flappers (turning from white to red) – hereby the red colour indicates the actual level. For the *MENKAR KA* it's transmitted to a display float.

Optional available switching systems are also activated by the measuring float.

In any case the magnetic transmission system operates without contact.

5.2 True level indication

Level measurement using the local indicator and scale

The float is equipped with a system of permanent magnets for transmitting the liquid level.

Due to design reasons, the minimum level in the measuring tube is given by the lower lateral flange connection axis i.e. liquid level zero is the centreline oft he lower connecting flange.

Important!
There is a difference between the true liquid level and the indicator position because:

- *The float is immersed to a certain depth depending on the product density and float type.*
- *Due to good stability the float magnets are positioned below the float centreline*.

If the product density is extremely different to the specified value in the order or in case of installing a different float type, the scale on the *MENKAR* needs to be adjusted to give an accurate reading.

Please contact Mecon GmbH für assistance.

5.3 Changing the process conditions

If the user wants to use the *MENKAR* to measure another product than specified, the following points should be observed:

- Contact Mecon GmbH for advice and information on equipment/product compatibility especially when a usage in hazardous areas is concerned.
- Ensure that Pressure Equipment Directive 97/23/EC is observed, if relevant.
- The depth of immersion of the float increases when the product density is decreased. This depth is also dependent on the float model and the material used (316L, 316Ti or titanium).

Further information are available from Mecon GmbH on request to accurately calibrate your instrument.

When contacting Mecon GmbH please notice:

- Quote Mecon GmbH references (order / fabrication no.) for your product.
- Identify the new fluid and specify its density at the new operating conditions.
- Give information about the previous application - floats may have been especially adapted for specific applications; for example: density-adjusted (pressurized) floats or floats with ballast for interface measurement.

The top of the float must be no more than 35 mm (1.38") above the product surface to ensure reliable floatability and accurate measurement.

6 Service

6.1 Maintenance

The devices were built within the scope of low maintenance but periodically the level indicator should be inspected for signs of corrosion, mechanical wear as well as damage to the fitting and the display unit.

We advice to carry out inspections at least once a year.

For a detailed inspection and cleaning the device must be removed from the piping.

Caution!

Appropriate safety precautions have to be taken when removing the device. Always use new gaskets when reinstalling the device onto a tank.

6.2 Returning the device to the manufacturer

Due to careful manufacturing processes and final inspections of equipment, trouble-free use of the *MENKAR* is expected when installing and operating in accordance with these instructions.

Should you nevertheless need to return a device to Mecon GmbH please observe the following points:

Caution*!*

According to the actual waste disposal directives, the owner/customer is responsible for the waste management of hazardous and toxic waste. For reasons of environmental protection and safeguarding the health and safety of our personnel ***all devices sent to Mecon GmbH to be repaired must be free of toxic and hazardous substances. This also applies to cavities of the devices. If necessary the customer is kindly requested to neutralize or rinse the devices before returning to Mecon GmbH.***

The customer has to confirm this by filling in an appropriate form which is available for download on the Mecon GmbH website:

www.mecon.de/en/declaration/contamination.pdf

***Caution**!*

In the case of returning devices, despite these requirements, which contain hazardous and toxic substances, Mecon GmbH is entitled to dispose these substances at the cost of the customer without any further inquiries.

6.3 Disposal

***Caution**!*

Disposal of the devices has to be carried out in accordance with relevant legislation in your country.

7 Application

Level indicators from the series *MENKAR* are suitable for the continuous measuring and monitoring of fluid levels in user defined open or closed vessels. The level in the vessel to be monitored is transmitted via a float analogue in the ration 1:1 to the indicating scale/magnet flapper type indicator. The measuring is independent of the operating pressure. The units are distinguished by a sturdy construction, trouble free operation and excellent readability, even from a considerable distance.

Different magnet activated contact units are optional available for control processes (acoustic or optical signals, motor control and valve control or similar devices). The contacts can be mounted in a user defined arrangement and the number of contacts is only restricted by a specified minimum distance.

The rugged design allows use in harsh conditions. Different types of process connections and floats meet industrial conditions.

Special features

- Universal opportunities of application with almost all kinds of fluids
- Simple, sturdy construction with magnetic transmission of measured values
- Strong, magnetic coupling system without mechanical transmission elements
- Excellent readability, even from considerable distances
- Available also for high pressures and temperatures
- User defined number and arrangement of contacts
- No hydraulic connection between indicating part and medium
- Low maintenance
- Wide measuring/indicating zone. Over 5000 mm in divided design
- Optional magnet flapper display available

8 Project development

The *MENKAR* units are manufactured with installation lengths up to 5000 mm; greater installation lengths are supplied in a sectioned design to simpify the transport. The fitting is carried out via flange connections. The following points should be observed corresponding to the respective operating data and the ambient conditions:

- Installation condition
- Type and design of unit
- Installation length / measuring range
- Type of scale (%, units of volume or height). For volumetric measurement a conversion table must be supplied by users. A scale may also be subsequently compiled and retrofitted. If rectangular, cubic or cylindrical vessels with flat or convex/concave bottoms in horizontal or vertical arrangement are to be used, the scale can be calculated in volumetric units by the manufacturer (on reimbursement of the net costs involved). The geometric dimensions of the vessel must be supplied to achieve this purpose.
- Gate valve: The equipment of the connection lines with a gate valve is recommended for cleaning purposes an to facilitate the installation and dismounting of the level indicator without the neccesity of interruption of operation

Supplementary data:

- Type of medium (including density and viscosity)
- Operating pressure and operating temperature
- Nominal width and design on the connection flange
- Nominal width and design of the front and blank flanges, in the case of deviation form the standard
- Gasket material

9 Technical Data

General Data

Range of application	Flow measurement of liquids
Measuring principle	Communicating tubes
Orientation	Vertical

Accuracy

Measuring/indicating tolerance:	±5 mm
Magnet flapper type indicator:	±10 mm

Measuring range/Coupling Clearance

Lower limit:	200 mm
Limit:	< 5000 mm unsectioned > 5000 mm sectioned

Medium

Density:	0,4 - 1,5 kg/dm³
Temperature:	0… + 398°C

Pressure limit

Standard	40 bar/ 150 lbs
Option	320 bar / 2500 lbs

Process connections

Nominal size:	DN 15 – DN 50 / ½" – 2" / Welding end
Pressure rating:	PN 40 – PN 320 / 150 lbs – 2500 lbs
Flange form:	B1, B2, Form D, Form C / Form RF, Form FF, Form RTJ

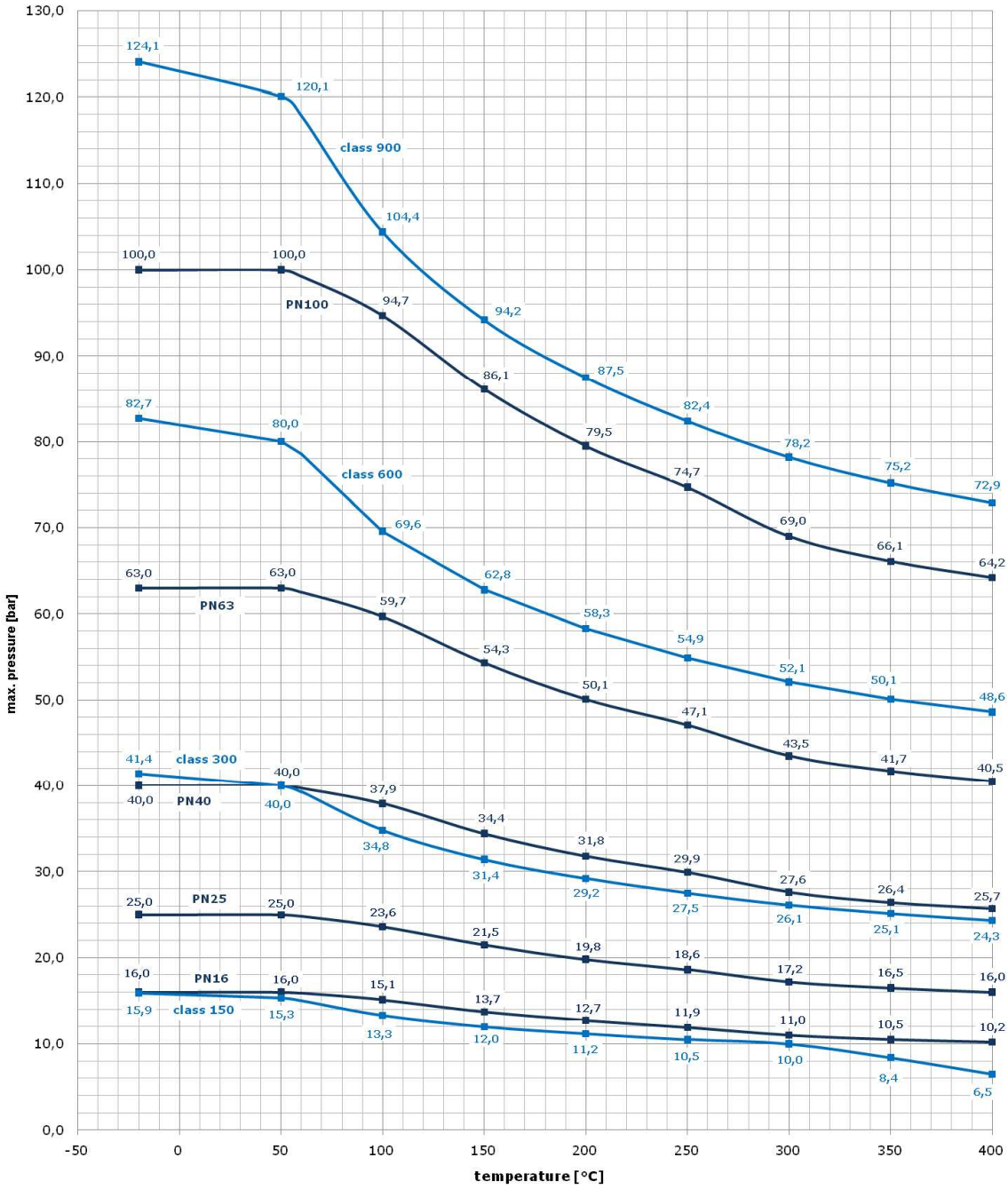
Front flanges / blank flanges

Nominal size:	DN 50 (EN 1092-1) 2" (ANSI B16.5)

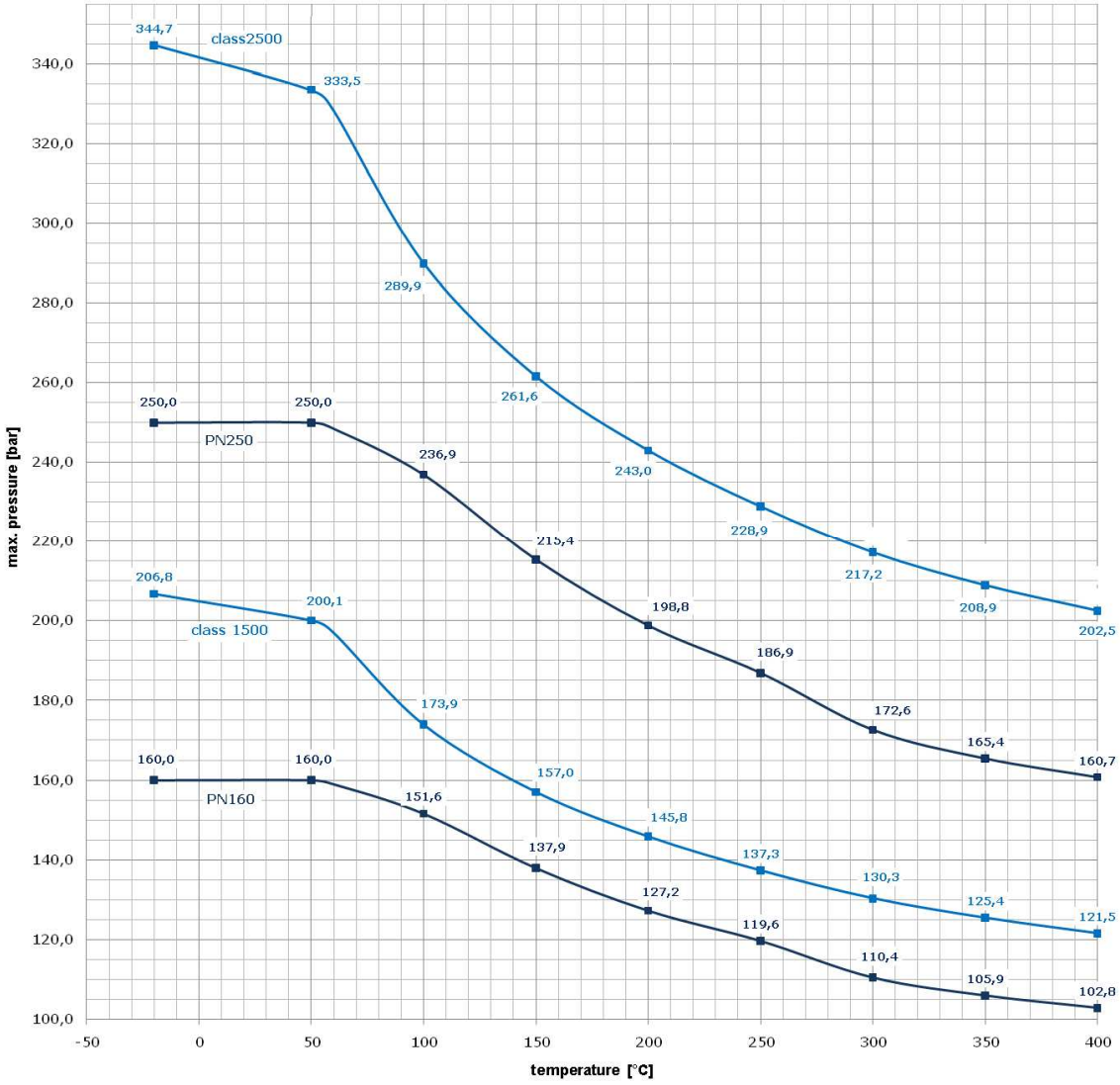
Wetted parts

Measuring tube:	Stainless steel
Connection tubes:	Stainless steel
Connection flanges:	Stainless steel
Measuring tube flanges:	Stainless steel
Bottom seal flanges:	Stainless steel
Measuring float:	Stainless steel / Titanium

9.1 Pressure limits vs. temperature stainless steel



Tab 9.1 Maximum Pressure PS vs. temperature up to class 900 / PN 100



Tab 9.2 Maximum Pressure PS vs. temperature up to class 2500 / PN 250

9.2 Certifications

CE marking

CE

The manufacturer certifies for the device *MENKAR* the fulfillment of all statutory requirements of the following EC directives by applying the CE marking:

- Pressure equipment directive 97/23/EC

9.3 Classification according to Directive (PED) 97/23/EC

Admissible media:	Gases and fluids, group 1
Category:	III *)

* Classification on the condition PS·V < 1000 (Article 3.1.1 a)

9.4 Dimensions

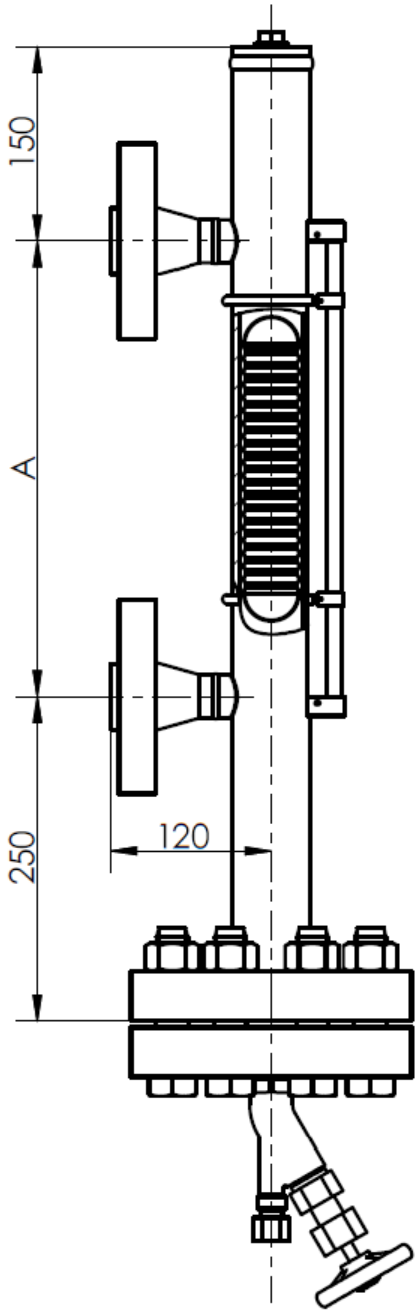
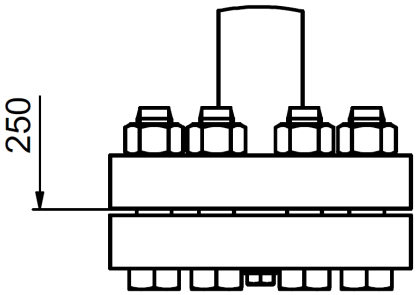


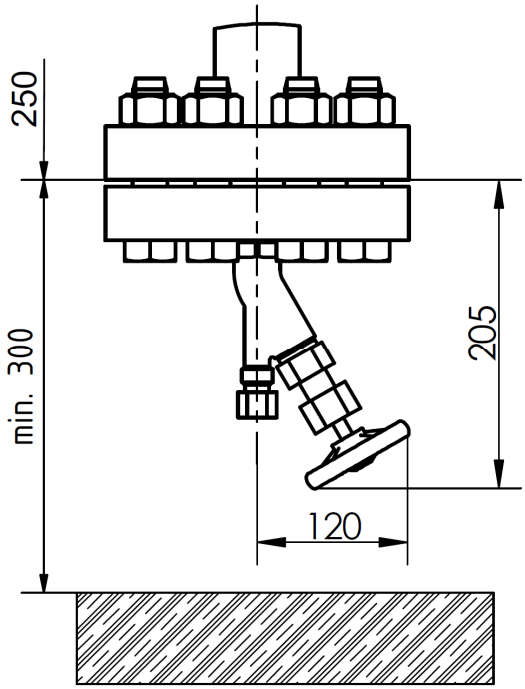
Fig.9.1 Dimensioned Drawing MENKAR

Drain connection

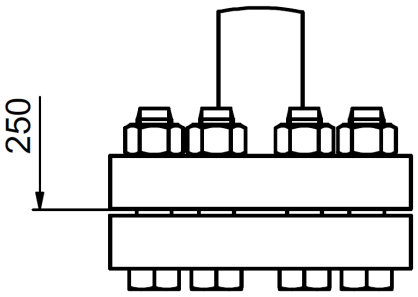
Version A: Drain plug G ½



Version C: Bleed valve G ½

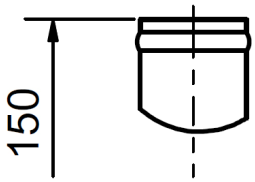


Version X: without

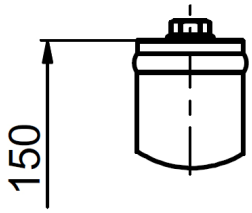


Vent connection

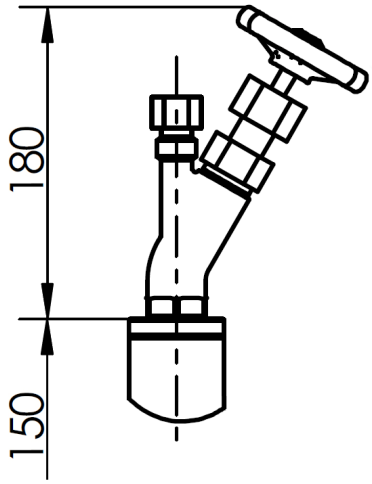
Version A: without (cap)



Version B: Screw plug G ½



Version C: Ventilation valve G ½



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